

## CLAIMS

### WHAT IS CLAIMED IS:

- 5           1.       A method of forming an image on a printing plate precursor comprising:  
                  providing a printing plate precursor comprising a substrate and an image  
forming layer applied onto the substrate, the image forming layer being selected to become  
less developable upon thermal treatment in the presence of a catalyst, and comprising at least  
one polymeric material;  
10                    imagewise contacting the image forming layer with a catalyst; and  
                  thermally treating the image forming layer such that portions of the  
image forming layer that are contacted with the catalyst are less developable in a developer  
liquid than portions of the image forming layer that are not contacted with the catalyst.
- 15           2.       The method of claim 1 wherein the image forming layer is capable of  
undergoing a catalyzed condensation reaction upon thermal treatment in the presence of the  
catalyst.
3.       The method of claim 1 wherein the at least one polymeric material comprises a  
20   polymeric binder.
4.       The method of claim 3 wherein the polymeric binder is capable of self-  
crosslinking upon thermal treatment in the presence of the catalyst.
- 25           5.       The method of claim 3 wherein the image forming layer comprises between  
about 20 and about 75 w/w percent polymeric binder.
6.       The method of claim 3 wherein the image forming layer comprises between  
about 30 and about 65 w/w percent polymeric binder.

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7. The method of claim 3 wherein the polymeric binder is capable of undergoing a condensation reaction with a polymeric crosslinking material in the presence of a catalyst.

8. The method of claim 3 wherein the polymeric binder is capable of undergoing  
5 a condensation reaction with a polymeric crosslinking material upon thermal treatment at a temperature range of between about 20 and about 200 °C in the presence of a catalyst.

9. The method of claim 1 wherein the image forming layer comprises at least one polymer or copolymer having a hydroxyl, vinyl, acrylate or methacrylate moiety or a  
10 combination or derivative thereof.

10. The method of claim 1 wherein the image forming layer comprises a polymeric material derived from phenol.

11. The method of claim 1 wherein the image forming layer comprises a novolak  
15 resin.

12. The method of claim 1 wherein the image forming layer comprises poly(4-hydroxystyrene), poly(4-hydroxystyrene/methylmethacrylate), poly(2-hydroxyethylmethacrylate/cyclohexylmethacrylate), poly(2-hydroxyethylmethacrylate/methylmethacrylate),  
20 poly(styrene/butylmethacrylate/methylmethacrylate/methacrylic acid), poly(butylmethacrylate/methacrylic acid), poly(vinylphenol/2-hydroxyethylmethacrylate), poly(styrene/n-butylmethacrylate/2-hydroxyethylmethacrylate/methacrylic acid),  
25 poly(styrene/ethylmethacrylate/2-hydroxyethylmethacrylate/methacrylic acid), poly (N-methoxymethyl methacrylamide/2-phenylethyl methacrylate/methacrylic acid) or combinations or derivatives thereof.

13. The method of claim 1 wherein the image forming layer comprises a  
30 polymeric crosslinking material.

14. The method of claim 13 wherein the image forming layer comprises between about 5 and about 40 w/w % polymeric crosslinking material.

5 15. The method of claim 13 wherein the image forming layer comprises between about 10 and about 25 w/w % polymeric crosslinking material.

16. The method of claim 13 wherein the polymeric crosslinking material is capable of undergoing a condensation reaction with a polymeric binder upon thermal  
10 treatment in the presence of a catalyst.

17. The method of claim 13 wherein the polymeric crosslinking material is capable of undergoing a condensation reaction with a polymeric binder upon thermal treatment at a temperature range of between about 20 and about 200 °C in the presence of a  
15 catalyst.

18. The method of claim 13 wherein the polymeric crosslinking material is a self-crosslinking material.

20 19. The method of claim 1 wherein the image forming layer comprises a resole resin.

20. The method of claim 19 wherein the resole resin is prepared from a C<sub>1</sub>-C<sub>5</sub> alkylphenol and formaldehyde, a tetra C<sub>1</sub>-C<sub>5</sub> alkoxymethyl glycoluril, poly(4-methoxymethylstyrene), poly[(N-methoxymethyl) acrylamide], poly[(N-iso-butoxymethyl) acrylamide], or a butylated phenolic resin.  
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21. The method of claim 1 wherein the image forming layer comprises a C<sub>1</sub>-C<sub>5</sub> alkoxymethyl melamine resin, a C<sub>1</sub>-C<sub>5</sub> alkoxymethyl glycoluril resin, a poly(C<sub>1</sub>-C<sub>5</sub> alkoxy-

methylstyrene) resin, a poly(C<sub>1</sub>-C<sub>5</sub>-alkoxymethylacrylamide) resin or a derivative or combination thereof.

22. The method of claim 1 wherein the image forming layer comprises a novolak  
5 resin and a resole resin.

23. The method of claim 1 wherein the image forming layer further comprises a  
colorant.

10 24. The method of claim 23 wherein the image forming layer comprises between  
about 0.5 and about 10 w/w % colorant.

25. The method of claim 1 wherein the catalyst is imagewise ink-jet applied onto  
the image forming layer.

15 26. The method of claim 1 wherein the catalyst comprises an acid.

27. The method of claim 26 wherein the acid has a pK<sub>a</sub> of no more than 8.

20 28. The method of claim 26 wherein the acid has a pK<sub>a</sub> of no more than 4.

29. The method of claim 26 wherein the acid has a pK<sub>a</sub> of no more than 3.

30. The method of claim 26 wherein the acid comprises a sulfonic acid,  
25 bromoacetic acid, oxalic acid, maleic acid or combinations thereof.

31. The method of claim 1 wherein the catalyst is contacted with the image  
forming layer as a liquid mixture.

30 32. The method of claim 31 wherein the liquid mixture comprises a carrier.

33. The method of claim 32 wherein the carrier comprises an aqueous solvent, an organic solvent, or a combination of water and a water miscible organic solvent.

5 34. The method of claim 33 wherein the organic solvent comprises an alcohol, acetate, ketone, glycol ether, ethylene glycol, diethylene glycol, triethylene glycol, trimethylol propane or combinations thereof.

10 35. The method of claim 31 wherein the liquid mixture further comprises one or more additives.

36. The method of claim 35 wherein the one or more additives comprise polymeric binders, dispersing agents, humectants, biocides, surfactants, viscosity builders, colorants, pH adjusters, drying agents, defoamers or combinations thereof.

15 37. The method of claim 31 wherein upon contacting the liquid mixture, portions of the image forming layer dissolve, disperse or swell.

20 38. The method of claim 31 wherein the surface tension of the liquid mixture is between about 20 and about 60 dynes/cm.

39. The method of claim 31 wherein the surface tension of the liquid mixture is between about 30 and about 50 dynes/cm.

25 40. The method of claim 1 wherein the thermal treatment step comprises heating the image forming layer at between about 20 and about 200 °C.

41. The method of claim 1 wherein the thermal treatment step comprises heating the image forming layer at between about 75 and about 150 °C.

42. The method of claim 1 wherein the thermal treatment step comprises heating the image forming layer at between about 90 and about 130 °C.

43. The method of claim 1 wherein thermal treatment step occurs for between  
5 about 15 and about 300 seconds.

44. The method of claim 1 wherein the thermal treatment step occurs for between about 30 and about 90 seconds.

10 45. The method of claim 1 further comprising drying the image forming layer after contacting with the catalyst.

46. The method of claim 45 wherein the drying step comprises air drying the image forming layer.

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47. The method of claim 1 wherein the substrate is an aluminum substrate.

48. The method of claim 47 wherein the substrate is grained, anodized or both.

20 49. The method of claim 47 wherein the substrate is post treated with polyvinylphosphonic acid.

50. The method of claim 1 wherein the providing step further comprises:  
providing a substrate; and  
25 applying onto the substrate a coating mixture comprising:  
a carrier, and  
one or more polymeric materials.

51. The method of claim 50 wherein the coating mixture further comprises a  
30 surfactant, biocide, humectant, dispersing agent or a combination thereof.

52. A method of forming a printing plate comprising:

providing a printing plate precursor comprising a substrate and an image forming layer applied onto the substrate, the image forming layer being selected to become less developable upon thermal treatment in the presence of a catalyst, and comprising one or more polymeric materials;

imagewise contacting the image forming layer with a catalyst;

thermally treating the image forming layer such that portions of the image forming layer that are contacted with the catalyst are less developable in a developer liquid than portions of the image forming layer that are not contacted with the catalyst; and

contacting the image forming layer with a developer liquid to remove the portions of the image forming layer that are not contacted with the catalyst.

53. The method of claim 52 wherein the developer liquid comprises an aqueous alkaline developer.

54. The method of claim 52 wherein the developer liquid has a pH of at least about 11.

55. The method of claim 52 wherein the developer liquid has a pH of at least about 12.

56. The method of claim 52 wherein the developer liquid has a pH of between about 12 and about 14.

57. The method of claim 52 wherein the developer liquid comprises at least one metal silicate.

58. The method of claim 57 wherein the developer liquid has a ratio of silicon oxide to metal oxide of at least about 0.3.

59. The method of claim 57 wherein the developer liquid has a ratio of silicon oxide to metal oxide of between about 0.3 and about 1.2.

5 60. The method of claim 57 wherein the developer liquid has a ratio of silicon oxide to metal oxide of between about 0.6 to about 1.1.

61. The method of claim 57 wherein the developer liquid has a ratio of silicon oxide to metal oxide of between about 0.7 to about 1.0.

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62. The method of claim 57 wherein the metal silicate comprises lithium silicate, sodium silicate, potassium silicate or a combination thereof.

63. The method of claim 52 wherein the developer liquid is free of organic  
15 solvents.

64. The method of claim 52 wherein the developer liquid comprises at least one hydroxide moiety.

20 65. The method of claim 64 wherein the developer liquid comprises ammonium hydroxide, sodium hydroxide, lithium hydroxide, potassium hydroxide or a combination thereof.

66. The method of claim 52 wherein the developer liquid comprises a combination  
25 of a metal silicate and a hydroxide containing compound.